



Radionuclide Regulations, Treatment and Affordability

***Anthony E. Bennett, R.S.
Texas Commission on
Environmental Quality
Water Supply Division***

Introduction

- ***Rules Schedule***
- ***Radionuclides***

Gross Alpha

Radium 226 and 228

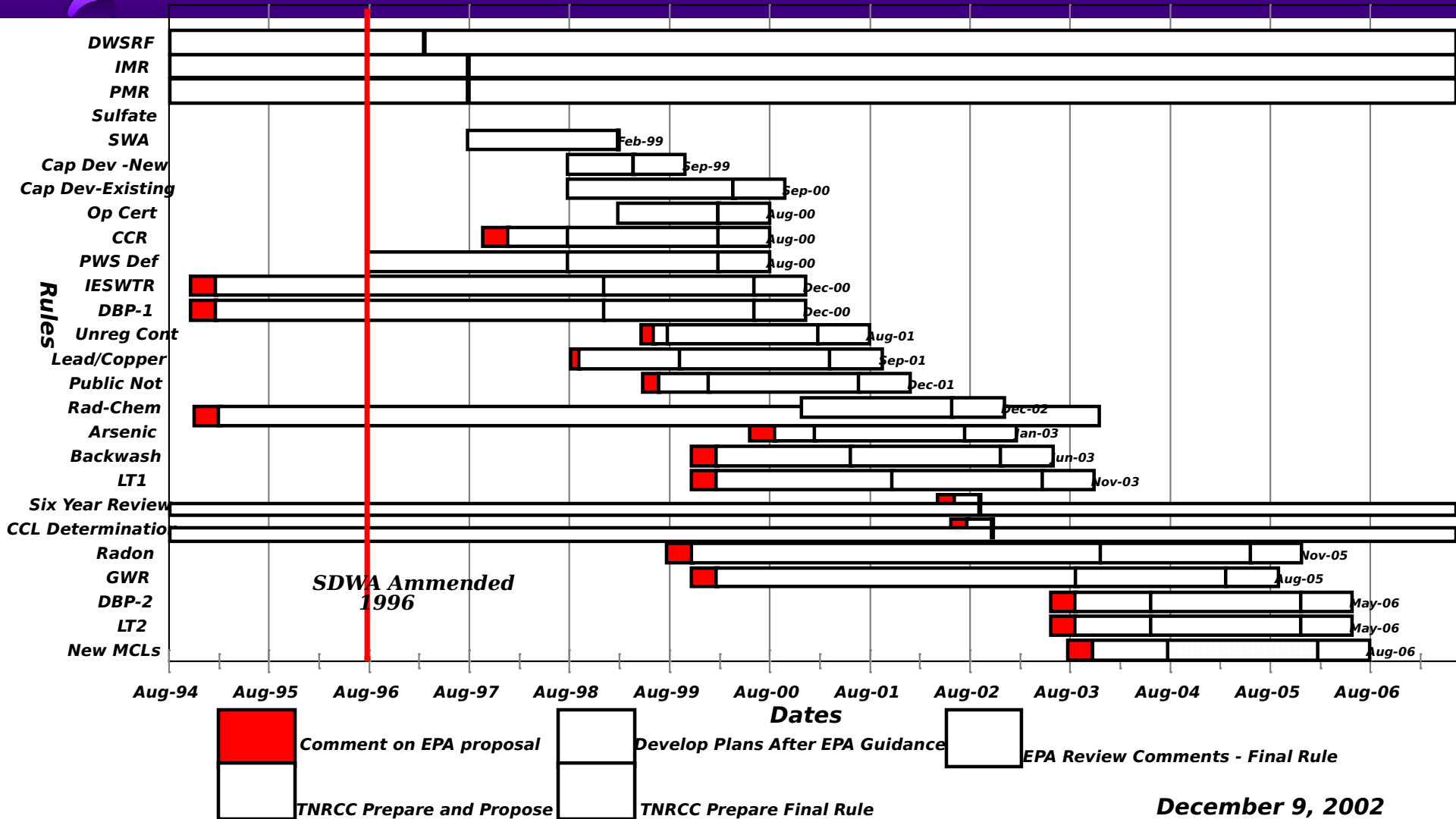
Uranium

Gross Beta

- ***Treatment***
- ***Costs***

Rules Adoption

Public Water System Rule Schedule EPA Initiated Rules





Existing Radionuclide Rules

- Gross Alpha 15 pCi/L
- Radium 226 and 228 5pCi/L
- Gross Beta 4 mrem/yr

Radionuclides

(except Radon)

- ***EPA published NODA on April 21, 2000***

***Maintain current 5 pCi/L for Ra
226/228***

***Maintain current 15 pCi/L for Gross
Alpha***

***Three options for Uranium MCL at
20, 40 and 80 pCi/L***

- ***December 7, 2000
final regs on radium, uranium,***

Radionuclides Schedule

- ***TCEQ Propose Rules***

May 2004

- ***TCEQ Final Rules***

December 2004

- ***Federal Effective Date***

December 2003

- ***TCEQ Effective Date***

January 2004

Proposed Radionuclide MCLs

- ***Gross Alpha***

- 15 pCi/l - 94 violations***

- ***Radium 226 & 228***

- 5 pCi/l - 94 violations***

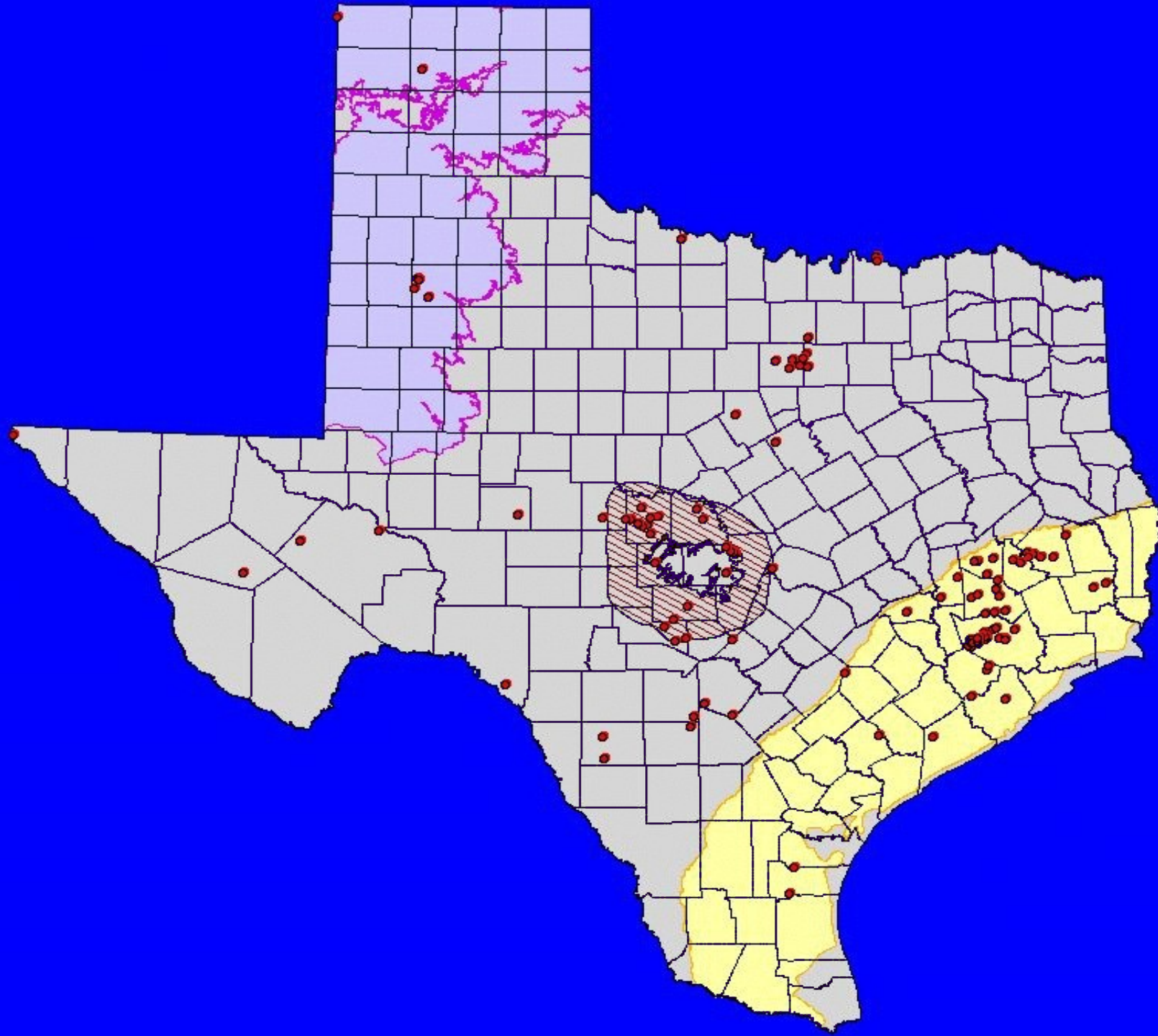
- ***Uranium***

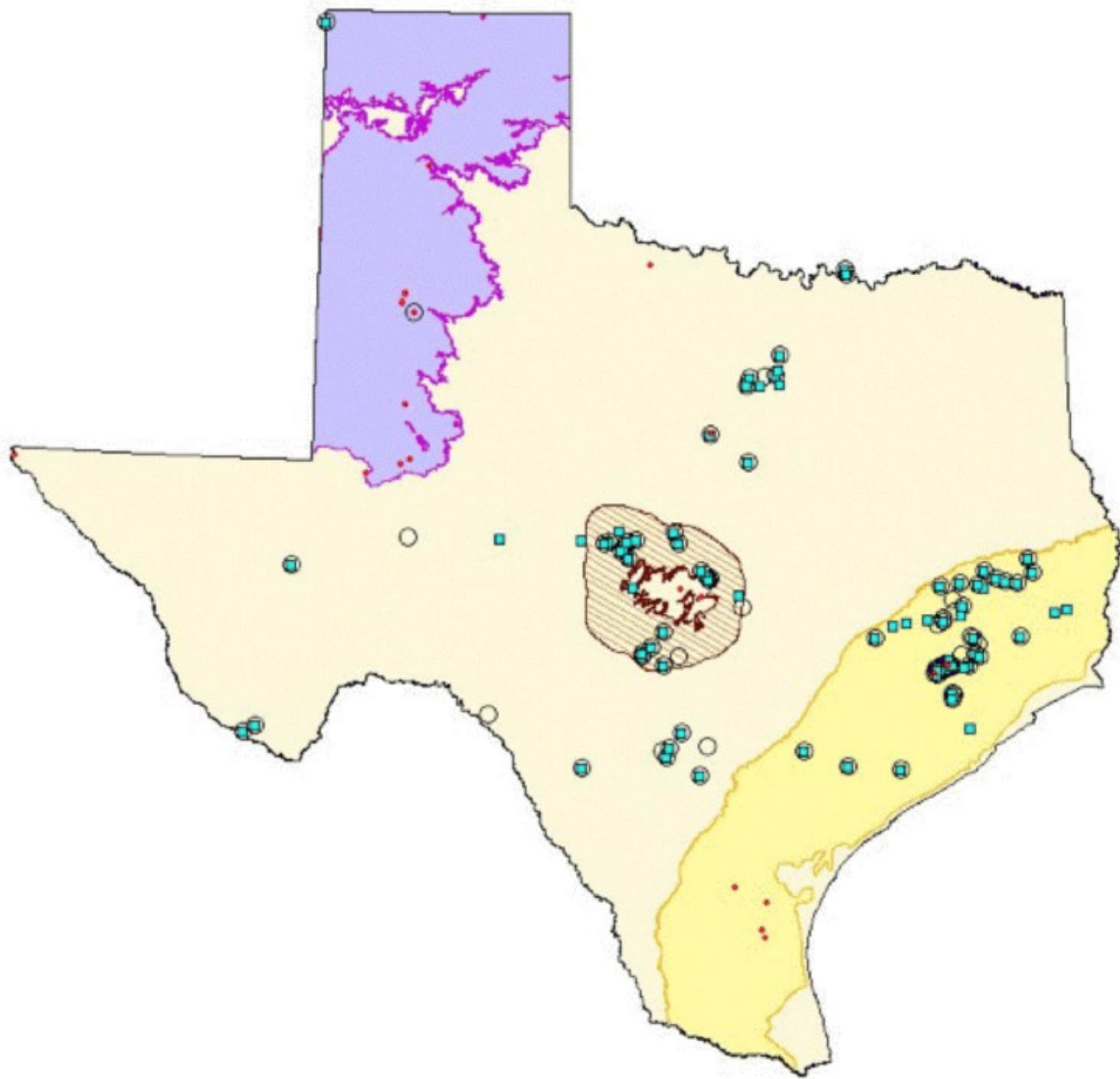
- 30 pCi/l - 23 violations***

- ***Radon***

- 300 pCi/l - 850 violations***

- 4000 pCi/l - 50 Violations***





Compliance Options

- ***New/Different Water Source***

- ***Managing Existing Sources***
Developing New Sources
Purchasing water

- ***Treatment***



Treatment for Radionuclides

- 
- ***Demineralization***
 - ***Ion Exchange***
 - ***Lime Softening***
- 

Demineralization

- ***Membrane process that removes a percent of most soluble inorganics***
- ***Produces a “Reject” stream of concentrated contaminants***

Ion Exchange

- ***Resin adsorption process which exchanges one cation for another***
- ***Produces a “Regeneration” stream of high levels of salt and concentrated contaminants***

Lime Softening

- ***High pH precipitation and removal process***
- ***Produces a “Lime Sludge” which includes concentrated contaminants***

No Discharge Contaminant Specific Resins

- ***Essentially an Ion Exchange process which has a long life***
- ***Produces no onsite discharge or waste***
- ***Resin is removed when “spent” and replaced with***

Residuals

Management

Liquid Residuals

- **Can**

- **Discharge to environment**
- **Must meet effluent standards (60/60/300)**
- **Discharge to Sewage Collection System**
 - **Must meet effluent standards (600/600/3000)**
 - **Non Commercial Class I injection well**

- **Can't**

- **Residuals above effluent standards**



Residuals Management

- ***Solid Residuals***

- ***Can***

- ***Out of State Licensed NORM Facility***

- ***Can't***

- ***In State NORM Waste Facility***

- ***In State Class I NORM injection well***



Treatment Costs

- ***Capital Costs***
- ***Operation and Maintenance Costs***
- ***Residuals Management Costs***

Treatment Costs

- ***Surveyed Water systems or applied models***

- ***Cost Range (Per Connection)***

\$1 per month for managing existing sources

\$140 per month for small water system RO treatment

- ***New Treatment Technologies in the range of \$10 to \$25 per month per Connection***

Conclusions

- ***Radionuclides are naturally Occurring in Parts of Texas***
- ***Radionuclide regulations have recently been revised***
- ***New Regulations will create more violations***
- ***Several Compliance Options***
- ***Treatment options Limited by residuals management options and costs***